

LIGHTING

The basic function of roadway lighting is to provide safety and security on the highway system. To promote the image of a visually appealing city, it is necessary for lighting designers to also consider the appearance of the lighting units and the aesthetic effects of the artificial light they cast.

Functionally, the primary purpose of street and roadway lighting is to provide safety, security and orientation. Lighting assists pedestrians and motorists reach their destinations safely. It is particularly useful in areas of potential conflict, such as within intersections and other pedestrian crossings. Within highway corridors, the pattern of poles and luminaires along the route also provides guidance to motorists by delineating roadways and ramps.

Aesthetically, street and roadway lighting must go beyond its primary function of illumination if it is to enhance the appearance of the city and the highway corridor. Like a prison yard, too much light creates a disconcerting glare, obscuring the enchanting luminosity of urban life. Too little light makes environments look gloomy and unsafe. Good lighting searches for the qualities of light that enrich our relationship to the world. It should not be measured by foot-candles alone. Highway lighting should be compatible with its surroundings during the day and help transform the roadway environment into an attractive inviting public place at night.

Continuous roadway lighting will be provided in the between 19th Street NW and the TH14 East Junction Interchange. Interchange and ramp terminal lighting will be provided throughout the highway corridor. The highway lighting system will use Mn/DOT's standard roadway lighting units, including high performance cobra head cutoff fixtures designed to minimize glare and light spill. On frontage roads and city streets, where lighting uniformity may be less demanding, semi-cutoff type fixtures will be used consistent with the expectations of the maintaining authority. Use of lower wattage lamps and wider pole spacing is a possibility that designers should discuss. On bridges with pedestrian walkways or developed streets capes, architectural lighting will be required, although all of the details associated its design are yet being developed.

Mn/DOT practice is a context-sensitive design approach as a means of responding to the values of Minnesota's citizens. To guide this practice, Mn/DOT has established guidelines for core transportation design, as well as, aesthetic cost participation. When local demand for lighting design treatments exceed these guidelines, cost sharing by local units of government may be required. Mn/DOT's policies which apply to lighting design are available upon request.

Questions concerning highway lighting design details should be coordinated with the Lighting

Unit in Mn/DOT's Office of Traffic Engineering. Questions concerning lighting on frontage roads and city streets should be coordinated with Rochester's Public Works Department.

AESTHETIC DESIGN RECOMMENDATIONS

7.1 Design Standards

Mn/DOT's approach to highway lighting design consists of the use of 250 watt high pressure sodium (HPS) lamps, 30 to 50 foot mounting heights above the roadway and a pole spacing of between 210 feet and 260 feet along the roadway. When poles are located between 19 feet and 23 feet from the edge of the traveled roadway in side grass berm areas, this typically results in an illumination level of between 0.6 and 0.8 foot candles on the roadway pavement. This is the design criteria that also will also be used on this project.

While this approach to highway lighting satisfies core transportation design, it may not be practical in all situations. These situations must be evaluated individually, so that approved design alternatives blend with the project as a whole.

7.2 Pole and Fixture Type

Lighting units for the new highway mainlines and ramp terminals consist of davit poles and cobra head style fixtures of the type commonly used on the Minnesota State Highway System. The poles are typically supplied as multi-sided, tapered, stainless steel standards without horizontal welds and a sand-blasted frost finish. Configurations include a gracefully curved "davit" mast arm ideal for highway applications. To send a quality statement to the roadway environment by reducing glare and improving lighting levels, the Aesthetic Committee recommended selection of lighting units with long radius mast arms and high performance cutoff fixtures. The pole type supplied on the first construction contract for the project should be matched in all remaining contracts of the project, so that aesthetic continuity is preserved within the highway corridor.

Figure 7-1: Roadway Lighting Units The Aesthetic Committee recommended selection of lighting units with long radius mast arms and high performance cutoff fixtures.

7.3 Bridge Lighting

The psychological effect of under bridge lighting on the passing motorist should be a part of the roadway lighting design and construction. Generally, under bridge lighting is not provided on highway mainlines. However, because several of the bridge structures of this corridor will be wider than normally provided, standard Mn/DOT "wall pack" lighting units will be placed

approximately every 50 feet along the length of the abutment face.

While standard lighting design and products have been recommended by the Aesthetic Committee for the mainlines of the new highway corridor, the proposal for the architectural lighting system planned for the bridges of the project will be anything but “standard”. Although designed for architectural effect, it will provide safety and security as well.

The aesthetic vision for the architectural lighting of the new bridges at 55th Street NW, 41st Street NW, 37th Street NW, 19th Street NW, 6th Street SW and 2nd Street SW includes an array of special design treatments intended to assume a significant role in strengthening community identification. Of these treatments, the primary design includes a unique solid-core fiber system, like that developed by the 3M Company, that will illuminate the arch shaped railing systems on the outside with accent and color. See figure 7-2 for additional details. Unlike neon, solid core plastic light fiber transports light from source to remote destinations without heat and is safe to touch. On the inside of the railing, a tubular cove lighting system will softly illuminate the pedestrian walkways of these bridges, while adding to the design effect.

While both the solid-core fiber and tubular lighting systems are state-of-the-art and offer many exciting design opportunities to compliment the architectural qualities of the bridge railing systems, it also must be noted that the highway application proposed is experimental, and, as such, could affect the safety of the traveling public if it is not properly designed. The City has hired the consulting engineering firm of Hammel Green and Abrahamson (HGA) of Minneapolis, MN to study various design options made possible with this type of architectural lighting system, as well as, to recommend solutions that will avoid motorist distractions.

To avoid design conflicts, the Committee also recommended that street lighting should be avoided between the ramp terminals associated with the bridges of this corridor.

Figure 7-2: Architectural Lighting Concept A solid-core fiber system, like that developed by the 3M Company, will accent the new bridges of the corridor with effect lighting and color.

Figure 7-3 (day) and 7-4 (night): Design Visualizations Hammel Green and Abrahamson (HGA) prepared these day and night computer simulations for the City of Rochester to illustrate the proposed architectural lighting concepts recommended by the Aesthetic Committee.

Costs for architectural and aesthetic lighting will be distributed in accordance with guidelines established by Mn/DOT for core transportation design. Because the architectural lighting system proposed for many of the new parkway bridges will result in a more costly lighting design than normally required to meet safety requirements, considerable cost sharing should be anticipated by the City regarding the bridge design solutions recommended by the Aesthetic Committee.

7.4 Painting and Finishing

Lighting poles should be stainless steel or aluminum. There are no additional requirements for theme painting.

The color of the architectural lighting system components placed on bridges should be coordinated with the color of the metal railing systems of these structures. It should be painted to match Federal Standard 595B Color No.14066 (Forest Green) as required.

The type and color of the lighting units placed along frontage roads and city streets constructed by this project should match local design themes. Consult local officials for requirements.

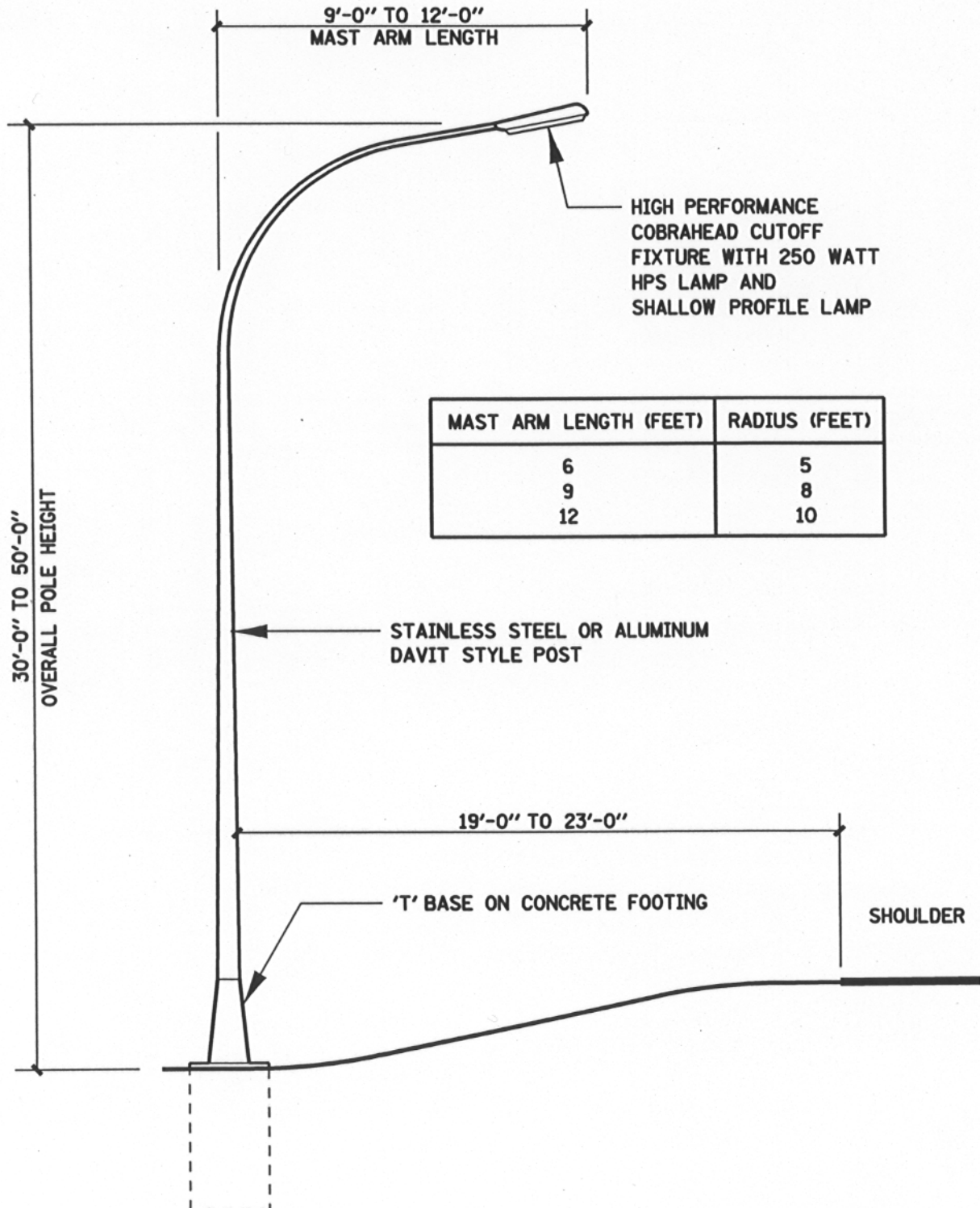
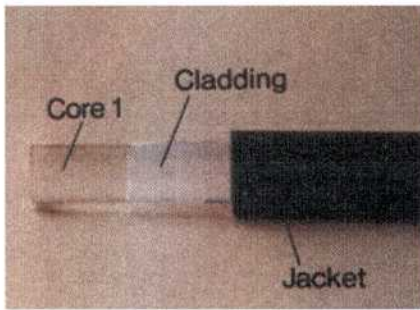


Figure 7-1: ROADWAY LIGHTING UNITS

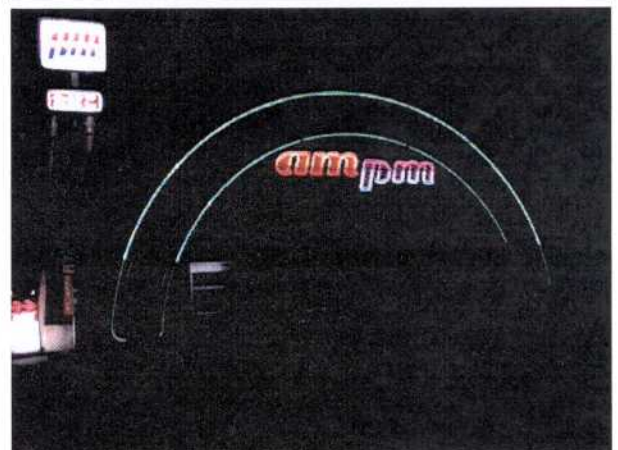
THE AESTHETIC COMMITTEE RECOMMENDS SELECTION OF LIGHTING UNITS WITH LONG RADIUS MAST ARMS AND HIGH PERFORMANCE CUTOFF FIXTURES.



Unlike neon, solid core, plastic light fiber transports light from a source to remote destinations without heat and is safe to touch.



(Photo by 3M Company)



(Photo by 3M Company)

Figure 7-2: Architectural Lighting Concept A solid-core light fiber system, like that developed by the 3M Company, will be used to accent the new bridges of the highway corridor with effect lighting and color.



information:

Highway 52 and 2nd Street SW bridge
Median view westbound along 2nd Street SW

date:

10/12/01

file:

bridge_m_d.ai

computer simulation / graphics created by:

 **product
design**sm
www.iproductdesign.com

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